II. REVIEW OF CURRENT LITERATURE RELATING TO GENERAL SCIENCE

CHARLES J. PIEPER
University of Chicago

The literature relating to general science for the year 1917 differs from that of previous years in that less emphasis is given to the question of the desirability and value of the course and more discussion is given to the questions of how to organize, administer, and teach the course.

An extensive bibliography of articles in current educational magazines relating to the general science situation is being prepared annually for the March number of the *General Science Quarterly* by W. L. Eikenberry. It will be unnecessary therefore to include a bibliography of this literature in the present review.

A. BOOKS ON TEACHING OF SCIENCE

While no book on the teaching of general science has been published there have appeared three publications which relate closely to the subject and which are of interest to those who teach or supervise general science courses.

TWISS, G. W. *Science Teaching.* New York: Macmillan, 1917. Pp. 479.

After long experience as a teacher of science, a high-school inspector, and a professor of educational principles and practice, the author has prepared this text for prospective teachers of the natural sciences. The first eleven and the last chapters discuss the principles which apply to the teaching of all science courses. Chapters xii–xxiii treat the particular sciences, including biology, geography, physics, chemistry, and general science. Each of the special sciences excepting general science is considered from the viewpoints of principles, methods, and equipment. While the chapter on general science is rather brief and somewhat disappointing, the first part of the book contains valuable material for the general science teacher under the chapter titles: "Meaning of Science," "The Viewpoint of the Science Teacher," "The Genesis of Science," "Methods of Teaching," "Educational Functions and Value of the Sciences," "The Disciplinary and Cultural Values of Science," "Classroom and Laboratory Instruction," "Lectures, Excursions, and Reviews," "Equipment for Science Teaching," and "The Sciences and the Curriculum." Each of these topics is treated in a practical manner. The author has not made the mistake of excessive theorizing on the values of science instruction. It is hardly possible to state in a few words the underlying principle of the book, yet one can gain what the reviewer believes to be the message of the book, as far as concerns method and aims, by quoting one of the four fundamental principles stated on page 21: "The scientific method is essentially a method of solving problems that present either a utilitarian or an intellectual appeal;

therefore the true way to induct beginners into its use is to confront them with such problems, and guide them in using the scientific method in reaching their solutions."

Teachers' Manual—Upper Grades of Elementary School and First Year of High School, Bulletin No. 2, 1917. Board of Education, Commonwealth of Massachusetts. Pp. 50.

This manual is a revised form of the articles which have recently appeared in the *General Science Quarterly*. It has been prepared to stimulate an interest in the present movement toward better science teaching. Among the topics treated are: "Social Aspects of General Science," "Aims, Scope, Psychological Factors Affecting Method," "Material and Organization," "Sources of Material," "Selection of Units and Projects," and "Equipment." An excellent bibliography of reference-reading books is included. Several general units are outlined at some length. These include heat, water supply, and our food supply. Several additional units are briefly stated and offer valuable suggestions to those who wish to teach general science from the environmental viewpoint.

MAYMAN, J. EDWARD. *Teaching Elementary Science in Elementary Schools*. Publication No. 13. Department of Education, New York City, Division of Reference and Research.

General science literature has presented few results of experimental teaching. Although published in 1915, attention is called to this publication as an attempt to discover by experimentation the relative values of the different methods of science instruction. While the experimental work of the author was carried on in the elementary-school science classes, his method is applicable to general science. By extensive testing in fourteen classes the following methods of teaching science are compared: (*a*) the book method, (*b*) the lecture method, (*c*) the experiment method, (*d*) the experiment-notebook method. A few interesting conclusions are listed below.

a) Carefully written notebook work and neatly drawn diagrams of science apparatus do not increase the pupils' knowledge of elementary science.

b) As regards elementary science, elementary-school pupils cannot get the thought from the printed page. Simple diagrams are of no material aid.

c) Poor experimental demonstration is detrimental to efficient teaching.

d) The book method might be used with fairly good results provided the class is exceptionally bright.

B. TEXTBOOKS OF GENERAL SCIENCE

Four textbooks, which have been published since the last review, are mentioned.

FALL, DELOS. *Science for Beginners*. New York: World Book Co., 1917. Pp. 382.

According to the author this text is not a course of information. Its chief purpose is to introduce the pupil to the scientific method by which he

may gain information for himself. It is difficult to state any organizing principle for the text other than that it attempts to present the simple physics and chemistry of everyday experiences. Little space is allowed the biological sciences and geography. Simple exercises are included in the text. Throughout the direct address is used to encourage the pupil to feel that this is his book. The first two chapters on "Science and the Scientific Method" and "What the Young Scientist Must Learn to Do" present a unique introduction to the subject-matter. One naturally raises the question, however, whether or not a real problem in science might not be a more impressive incentive to the scientific method of study than a discussion of what constitutes the scientific method in such quasi-scientific problems as are used. The text would appeal to elementary-school pupils, but the reviewer doubts if it would prove successful in his first-year high-school classes.

CLUTE, W. N. *Experimental General Science.* P. Blakiston's Son & Co., 1917. Pp. 294.

One who expects to find in this publication a large number of simple experiments to be used as a basis for science study must be disappointed on examining it. There are at the ends of the chapters lists of questions which include some practical exercises. The text or descriptive material which precedes the questions abounds in mature generalizations which defeat one of the major purposes of general science-teaching. Thirty of the forty-two chapters relate to physics and chemistry. Nearly all of the remaining chapters, which discuss living things, treat of human physiology and hygiene.

LAKE, CHARLES H. *General Science.* Silver, Burdett & Co., 1917. Pp. 436.

The twenty-four chapters of this text are very comprehensive in their treatment of the elementary facts, principles, and applications of the science of our daily lives. An attempt is made to relate each chapter to the preceding one. Exercises are included in the text, but a large amount of individual experimentation is not encouraged. For those teachers who believe in the textbook method of approach this text will fill a need. The text is somewhat formal in organization and perhaps too difficult for eighth-grade pupils. The various articles of the text contain many abstract statements which present difficulties for mastery without experimentation. The pupil is not led to see and solve problems but is given the finished product. The mechanical features of the book are of the best and the questions at the end of the chapters are well chosen.

COULTER, J. G. *Elementary Science.* New York: Scribner, 1917. Pp. 284.

"To develop some appreciation of nature as a great synthesis and our relation to it" is the principal motive of the text. The foreword—there is no preface—does not state the length of the course for which the book is intended. If it is meant to be a year course, it comes as a surprise to those who know the author's views on a two-year course. The text is written in an interesting

colloquial style, since, according to the foreword, this method of presentation has proved most effective with classes. The subject-matter is quite extensive for the size of the book and is divided into thirty-six chapters. The different sciences are well correlated. Water and related topics, such as water-power, soil formation, soil transportation, solutions, and mechanics of water, are treated first. This is a new departure and a good one. Ten of the thirty-six chapters treat of the biological sciences, geographical material receives considerable space, and approximately fifteen chapters discuss physical science subject-matter. The text is written for the pupil and will be read by him with interest. It will also be a help to the inexperienced teacher in motivating the work.

An Elementary General Science. Daniel R. Hodgdon. Hinds, Hayden, and Eldredge, Chicago.

The reviewer has not had an opportunity to examine this book. According to the announcement it has been prepared for the seventh and eighth grades, the first years of the high school, or the junior high school. The material is organized around the central theme, "The Home." Experiments and over a thousand questions are included. Fifteen chapters are given to the following subjects: (1) "Atmospheric Moisture and Evaporation," (2) "Moisture Coming from the Atmosphere," (3) "The Atmosphere," (4) "Transmission of Heat," (5) "Expansion and Heat Measurement," (6) "Oxidation and Its Relation to Life," (7) "Food and Medicine," (8) "Water," (9) "Germs and Disease,' (10) "Light and Its Relation to the World," (11) "Electricity," (12) "The Relation of Sound and Music to Us," (13) "The Universe," (14) "Machines and Work," (15) "Safety First."

C. ARTICLES OF ESPECIAL INTEREST

Space does not permit comments on the large number of excellent articles which have appeared during the past year. It may be of value, however, to list under separate classifications those articles which, in the opinon of the writer, are of particular interest.

1. ORGANIZATION OF GENERAL SCIENCE COURSES

BARBER, FRED B., "Fundamental Considerations in the Reorganization of High-School Science," *General Science Quarterly*, I, 102–11.

CARPENTER, HARRY A., "General Science in the Junior High School at Rochester, New York," Part II, Course of Study, *General Science Quarterly*, II, 255–66.

HUNTINGTON, E. D., "Elementary Science or General Science," *School Science and Mathematics*, XVII, 47–52.

JOHNSON, A. C., "The Selection and Arrangement of Materials in a General Science Course," *General Science Quarterly*, I, 83–88.

KELLY, H. C., "The Springfield Plan," *General Science Quarterly*, I, 191–200.

PATTON, L. M., "An Experiment in Eighth-Grade Science," *General Science Quarterly*, I, 73–82.

Report of Committee of North Central Association of Colleges and Secondary Schools on the Reorganization of the High School and Definition of Unit Proceedings, XXI, 171.

2. PRESENT CONDITIONS IN GENERAL SCIENCE

HARTMAN, CARL, "The General Science Situation in Texas," *School Science and Mathematics*, XVII, 141–46.

MARION, S. J., "The Status of Science Work in the High Schools of North Carolina," *North Carolina High School Bulletin*, VIII, 137–42.

RUCH, G. M., "The General Science Situation in Oregon," *General Science Quarterly*, I, 126–27.

RUSTERHOLTZ, J. H., "The Present Status of General Science in High Schools of Pennsylvania," *General Science Quarterly*, I, 223–27.

WHITMAN, W. G., "Credit for High-School General Science in Higher Institutions," *General Science Quarterly*, II, 301–3.

WORUN, A. A., "General Science in Michigan," *General Science Quarterly*, II, 267–84.

3. METHOD IN THE TEACHING OF GENERAL SCIENCE

BROWNELL, H., "Some of the Pedagogy of General Science," *General Science Quarterly*, II, 140–45.

DEWEY, JOHN, "Method in Science-Teaching," *Jour. N.E.A.*, I, 725–30.

DOWNING, E. R., "Supervised Study and the Science Laboratory," *School Review*, XXV, 646–51.

MILLER, G. R., "An Applied Science Shop in the Junior High School," *General Science Quarterly*, II, 297–98.

WOODHULL, J. F., "Aims and Methods of Science Teaching," *General Science Quarterly*, II, 267–84.

III. CURRENT EDUCATIONAL PUBLICATIONS RECEIVED IN APRIL, 1918

A. GENERAL EDUCATIONAL THEORY AND PRACTICE

EARHART, WILL, AND OTHERS. *Music in Secondary Schools.* United States Bureau of Education, Bulletin No. 49. Washington: Government Printing Office, 1917. Pp. 37.

FLEXNER, ABRAHAM. *General Education Board, Report of the Secretary, 1916–1917.* New York: The General Education Board. Illustrated. Pp. x+92.

JONES, W. FRANKLIN. *A Study of Handedness.* University of South Dakota: Vermilion, S.D. Pp. 80.

Public School Bulletin No. 1. Board of Education, Richmond, Ind., 1917.